AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A droplet discharging apparatus comprising:

means for discharging a discharge liquid in the form of droplets through an aperture by mechanically deforming a piezoelectric element by a normal drive signal;

a drive integrated circuit disposed adjacent to and in thermal contact with the piezoelectric element;

a control unit that selects between the normal drive signal and a cooling drive signal and supplies the selected normal drive signal or cooling drive signal to the drive integrated circuit;

a substrate attached to and in thermal contact with the piezoelectric element and the drive integrated circuit;

a diaphragm disposed adjacent to and in thermal contact with the piezoelectric element; and

a temperature sensor associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit;

wherein the sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element;

wherein the approximated temperature of the piezoelectric element approximates a temperature of the diaphragm;

wherein the approximated temperature of the diaphragm approximates a temperature of the discharge liquid;

wherein the control unit selects between the normal drive signal and the cooling drive signal based on the approximated temperature of the discharge liquid;

wherein the droplets are discharged from the aperture ~~by a~~ based on the selected normal drive signal or cooling drive signal ~~based on the approximated temperature of the discharge liquid, which is different from the normal drive signal~~; and

wherein a flushing process is implemented between cycles of normal discharge to set the temperature of the discharge liquid to a predetermined temperature.

2. (Original) The droplet discharging apparatus according to Claim 1, wherein the droplets are discharged for a plurality of times by the cooling drive signal so as to cool the discharge liquid to a specified temperature.

3. (Original) The droplet discharging apparatus according to Claim 1, wherein the cooling drive signal is set to a low frequency level that does not cause the piezoelectric element to heat the discharge liquid.

4. (Original) The droplet discharging apparatus according Claim 1, wherein the cooling drive signal has a waveform shape set so as to cause droplets of a maximum weight to be discharged.

5. (Original) The droplet discharging apparatus according to Claim 1, wherein if the temperature of the discharge liquid detected by a temperature detecting means exceeds a predetermined threshold temperature, then the droplets are discharged from the aperture by the cooling drive signal.

6. (Original) The droplet discharging apparatus according to Claim 1, wherein if the number of discharges within a predetermined time performed in response

to the normal drive signal exceeds a predetermined threshold number of times, then the droplets are discharged from the aperture by the cooling drive signal.

7. (Original) The droplet discharging apparatus according to Claim 1, wherein cooling discharge by the cooling drive signal is carried out between normal discharges of droplets by the normal drive signal.

8. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is a printing ink.

9. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is an electrically conductive material for forming a wiring pattern.

10. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is a transparent resin for forming a microlens.

11. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is a resin for forming a color layer of a color filter.

12. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is an electro-optic material.

13. (Original) The droplet discharging apparatus according to Claim 12, wherein the electro-optic material is a fluorescent organic compound exhibiting electroluminescence.

14-15. (Cancelled)

16. (Currently Amended) A droplet discharging method comprising:

sensing a temperature of a drive integrated circuit disposed adjacent to and in thermal contact with a piezoelectric element;

approximating a temperature of the piezoelectric element based on the sensed temperature of the drive integrated circuit;

approximating a temperature of a diaphragm disposed adjacent to the piezoelectric element;

approximating a temperature of a discharge liquid disposed adjacent to the piezoelectric element based on the approximated temperature of the diaphragm; ~~and~~

selecting between a normal drive signal and a cooling drive signal based on the approximated temperature of the discharge liquid;

discharging the discharge liquid in the form of droplets through an aperture by mechanically deforming the piezoelectric element based on the selected normal drive signal or cooling drive signal; and

~~wherein the discharge liquid is cooled by cooling discharge based on the approximated temperature of the discharge liquid, which is different from normal discharge; and~~

wherein a flushing process is implemented between cycles of normal discharge to set the temperature of the discharge liquid to a predetermined temperature.

17. (Currently Amended) The droplet discharging method according to Claim 16, wherein the cooling ~~discharge~~ drive signal is ~~carried out for~~ applied a ~~plurality~~ predetermined number of times so as to cool the discharge liquid to a specified temperature.

18. (Currently Amended) The droplet discharging method according to Claim 16, wherein the cooling ~~discharge~~ drive signal is set to a low frequency level that does not cause the piezoelectric element to heat the discharge liquid.

19. (Currently Amended) The droplet discharging method according to Claim 16, wherein the cooling ~~discharge~~ drive signal causes droplets of a maximum weight to be discharged.

20. (Currently Amended) The droplet discharging method according to Claim 16, wherein if the temperature of the discharge liquid exceeds a predetermined threshold temperature, ~~then~~ the cooling ~~discharge~~ drive signal is ~~carried out~~selected.

21. (Currently Amended) The droplet discharging method according to Claim 16, wherein if the number of normal discharges within a predetermined time exceeds a predetermined threshold number of times, ~~then~~ the cooling ~~discharge~~ drive signal is ~~carried out~~selected.

22. (Original) The droplet discharging method according to Claim 16, wherein cooling discharge is carried out during the normal discharge.

23. (Original) The droplet discharging method according to Claim 16, wherein the discharge liquid is a printing ink.

24. (Original) The droplet discharging method according to Claim 16, wherein the discharge liquid is an electrically conductive material for forming a wiring pattern.

25. (Original) The droplet discharging method according to Claim 16, wherein the discharge liquid is a transparent resin for forming a microlens.

26. (Original) The droplet discharging method according to Claim 16, wherein the discharge liquid is a resin for forming a color layer of a color filter.

27. (Original) The droplet discharging method according to Claim 16, wherein the discharge liquid is an electro-optic material.

28. (Original) The droplet discharging method according to Claim 27, wherein the electro-optic material is a fluorescent organic compound exhibiting electroluminescence.

29-30. (Cancelled)

31. (Previously Presented) The droplet discharging apparatus according to Claim 1, wherein the temperature of the discharge liquid is determined by detecting a temperature of the piezoelectric element.

32. (Previously Presented) The droplet discharging method according to Claim 16, further comprising determining a temperature of the piezoelectric element to approximate the temperature of the discharge liquid.

33. (Previously Presented) The droplet discharging apparatus according to Claim 1, wherein the diaphragm separates the piezoelectric element from the discharge liquid.

34. (Previously Presented) The droplet discharging apparatus according to Claim 1, wherein the piezoelectric element and drive integrated circuit are attached to the substrate by an adhesive.

35. (Previously Presented) The droplet discharging apparatus according to Claim 1, wherein the piezoelectric element and drive integrated circuit are attached to the substrate and are spaced apart from one another.

36. (Previously Presented) The droplet discharging method according to Claim 16, wherein approximating a temperature of the piezoelectric element includes approximating a temperature of a substrate in thermal contact with the piezoelectric element and the drive integrated circuit.